

Algae study to shed light on fish deaths

Researchers trying to identify species that cause harmful blooms

By CAROLYN KHEW

THE mass deaths of fish along the Johor Strait last month have thrown the spotlight on tiny algae that causes harmful blooms, but little is known about it, especially in this region.

A study by the Tropical Marine Science Institute (TMSI) is under way to identify microalgae species found in Singapore waters – a move that could help reduce the impact of blooms on fish stock.

The study's lead researcher, Dr Sandric Leong, a TMSI research fellow, said they hope to establish baseline data by first accurately identifying the bloom-forming species found in Singapore waters.

"Different harmful algal bloom species harm fish in different ways, and they may respond differently to environment changes... It is important to identify the organism correctly so appropriate mitigative actions are taken," said Dr Leong.

Up to 600 tonnes of fish were killed in the latest harmful algal bloom that hit local fish farmers about a month ago.

Farmers, including those in Changi, who were the worst affected, said the incident this year was more severe and more sudden than those in previous years.

The study by TMSI at the National University of Singapore started in December. It is funded by the Agri-Food and Veterinary Authority (AVA).

The study will involve isolating algal cells from natural seawater samples for DNA-sequencing. The cells will then be grown in pure cultures on which tests are run to determine the concentration levels that make them harmful to fish and conditions that cause them to form blooms.

Seawater samples have been collected mostly from the Johor Strait and, so far, three algal species have been isolated. The researchers hope to isolate more than 10 of them, said Dr Leong, before treating them with different kinds of nutrients to see what would trigger a bloom.

Pointing out the difficulties in extracting microalgae from seawater samples, Dr Leong said: "Most (algal) blooms usually have one species, but in our waters, we may have at least two different ones occurring together. When there isn't a bloom, a water sample could contain many different kinds of microalgae."

An algal bloom can contain anywhere between 10,000 and 500,000 cells per ml.

Harmful algal blooms are occurring more frequently worldwide due to climate change and increasing pollution, said deputy director of TMSI Serena Teo.

"It's important we know what species is causing the bloom," said Dr Teo. "If we don't... we won't know which mitigation methods will work best to prevent the fish kills."

Algal blooms cannot be prevented, but measures, such as storing fish temporarily in canvas bags, may help reduce the impact.

The information gathered will provide



The Tropical Marine Science Institute study's lead researcher, Dr Sandric Leong, says the information collected will provide the baseline data needed to plan an efficient early alert system and develop technology to lessen the impact of a bloom. PHOTO: LIM YAOHUI FOR THE STRAITS TIMES

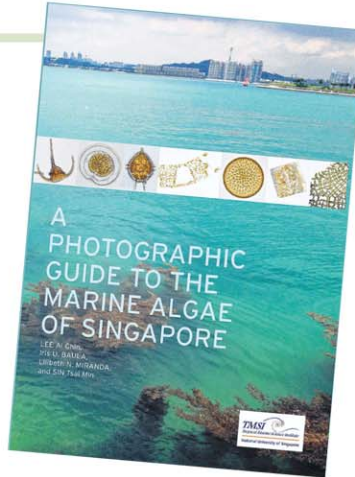
Spot the common species

THE Tropical Marine Science Institute (TMSI) has put together a book entitled *A Photographic Guide To The Marine Algae Of Singapore*, which features pictures and information on some of the more common algae species that can be found in local waters.

Published earlier this year, the book covers more than 100 commonly found algae species ranging from the larger seaweeds, also known as macroalgae, to microscopic algae.

"It is hoped that this book will become a pertinent primary source of information to scientists and naturalists alike," said Ms Michelle Lee, a TMSI research associate who was part of the team behind the book.

Red macroalgae *Halymenia durvillei* is among those featured in the book. The algae, which can grow to a height of at least 40cm, has a "slippery" feel and can be found on the reefs of the



Southern Islands. Dr Sin Tsai Min, Dr Lilibeth Miranda and Ms Iris Baula from the TMSI were the other authors. The book is available at the National University of Singapore Science Co-Op and directly from TMSI.
CAROLYN KHEW

the baseline data needed to plan an efficient early alert system and develop appropriate technology to lessen the impact of a bloom without damaging the environment, said Dr Leong.

As part of AVA's routine surveillance, waters around farming areas are closely monitored for temperature, salinity and dissolved oxygen, among other things.

There is also a continuous online water quality monitoring system at some coastal fish farms, which provides real-time data to assess water quality.

"In the event of impending poor water conditions, AVA provides early alerts to fish farms so that farmers can take the necessary precautions to safeguard their fish stocks," said an AVA spokesman.

The alerts include phone calls and messages.

"Farmers are also encouraged to notify AVA when they observe unusual fish or water conditions."

During a meeting with fish farmers last month, the AVA said it is looking into developing a colour-coded system to warn of adverse water conditions.

Meanwhile, the TMSI study will take at least three years to be completed, said Dr Leong.

"Unfortunately, the species baseline for our tropical South-east Asian region is as yet poorly studied. And we live in the most biologically diverse part of the marine world," he said.

✉ kcarolyn@sph.com.sg

The lowdown on plankton

What is plankton?

The name plankton is derived from a Greek word which means "wanderer" or drifter.

These micro-organisms include algae, bacteria and animals, which follow the sea currents.

The Agri-Food and Veterinary Authority had found elevated levels of *Karlodinium veneticum*, a microalgae species, in seawater samples following the latest plankton bloom about a month ago. This organism belongs to a group known as dinoflagellates.

What role does plankton play in the ecosystem?

It plays an important role, being the food for many animals ranging from filter-feeding invertebrates like

shellfish to large whale sharks.

How does it cause harm when it multiplies?

Algal blooms occur regularly but they rarely cause serious impacts. They become harmful when they:

- Take up oxygen from the water at night;
- Cause physical damage to fish gills due to their "spiny" structures; or
- Produce toxic chemicals which can be harmful to marine animals and humans. There are more than 4,000 bloom-forming species but only less than 5 per cent of them are toxic.

Sources: Dr Serena Teo and Dr Sandric Leong from the Tropical Marine Science Institute